# CODE

close all;

N = 500; % Max number of samples in a record

R = 300; % Number of records

u = randn(1,N); % Randomly Generate and fix uk

beta0 = 2; % True value of beta

var\_e = 1; % Variance in the error term

mserror = zeros(N-1,1); % Vector for storing the MSE at each sample size

beta\_vec = zeros(R,1); % Vector for storing beta estimate from each record

for n = 2:N

e\_mat = sqrt(var\_e)\*randn(R,n); % Each row represents one record

for r = 1:R

y = u(1:n)/beta0 + e\_mat(r,:);

% Estimate beta for record r

beta\_vec(r) = sum(u(1:n).^2)./sum(u(1:n).\*y);

end

beta\_hat = mean(beta\_vec);

mserror(n-1) = var(beta\_vec) + ((mean(beta\_vec)-beta0)^2);

end

plot((2:N),mserror);

set(gca,'fontsize',12,'fontweight','bold','xlim',[1 N]);

ylabel('MSE(ybar)','fontsize',14,'fontweight','bold');

title('Tracking MSE in $\beta$ along $N$ for GWN e(k)','fontsize',14,'fontweight','bold','interpreter','latex');

figure();

plot((50:N),mserror(49:end));

set(gca,'fontsize',12,'fontweight','bold','xlim',[50 N]);

ylabel('MSE(ybar)','fontsize',14,'fontweight','bold');

xlabel('Number of Samples per record','fontsize',14,'fontweight','bold');

title('Tracking MSE in $\hat{\beta}$ along $N$, zooming to the high N values','fontsize',14,'fontweight','bold','interpreter','latex');